

Capacitive Deionization (CDI) for Efficient Desalination of Water in Space, Phase I

Completed Technology Project (2018 - 2019)



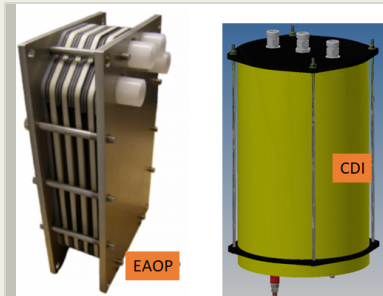
Project Introduction

In this Phase 1 SBIR proposal, Vuronyx Technologies will design an energy efficient, low footprint water recovery system for space applications. The proposed system will integrate two emerging water purification approaches - a capacitive deionization (CDI) system to remove ions, and an Electrochemical Advanced Oxidation Process (EAOP) to remove organic contaminants and microbes. The proposed work builds on our work with EPA where we are designing cost and energy efficient CDI systems for small communities, and with Oxfam, where we are designing desalination systems for refugee camps in third world countries. Vuronyx Technologies has demonstrated optimized CDI systems that ~45% lighter than conventional CDI systems, and can be operated at lower voltages to minimize energy consumption as well as to optimize the outlet salt concentration. In this proposal, Vuronyx will investigate a combined CDI-EAOP system to generate potable water from spacecraft wastewater.

Anticipated Benefits

The proposed technology will enable long term space travel, such as to Mars and beyond, without the need for carrying huge amounts of water in the spacecraft. Water recovered from waste streams can be used for multiple applications, including for drinking purposes.

Such systems will find use in civilian applications, such as for potable water in remote or disaster regions, purification of water from industrial sources, such as commercial laundry, automotive paint lines, agriculture and horticulture, and wastewater reuse for industries, such as cooling towers, boiler-feed, and irrigation for golf courses. And finally, the system can be used for point of entry water treatment in small communities, apartment complexes, hotels, and sport fields.



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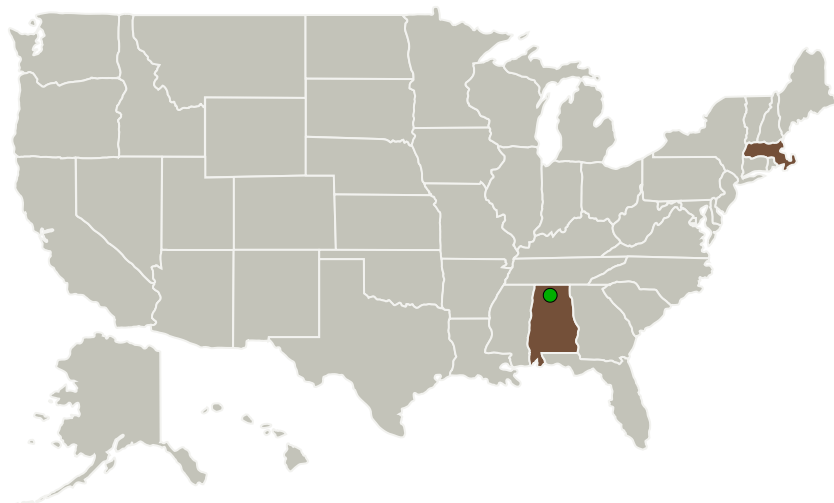
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Vuronyx Technologies	Lead Organization	Industry Small Disadvantaged Business (SDB)	Woburn, Massachusetts
● Marshall Space Flight Center (MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama	Massachusetts
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Project Transitions

**July 2018:** Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vuronyx Technologies

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

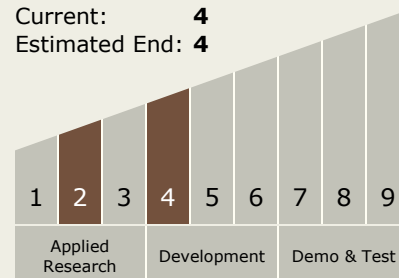
Carlos Torrez

Principal Investigator:

Sandip Agarwal

Technology Maturity (TRL)

Start: 2
 Current: 4
 Estimated End: 4



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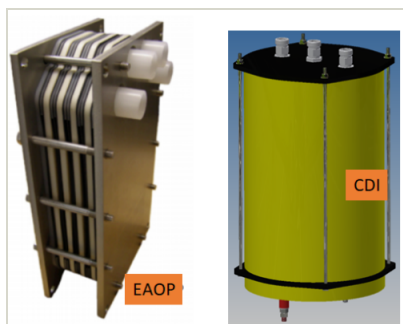


✓ **February 2019:** Closed out

Closeout Documentation:

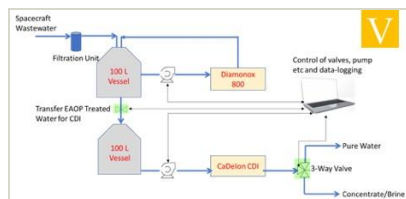
- Final Summary Chart(<https://techport.nasa.gov/file/141294>)

Images



Briefing Chart Image

Capacitive Deionization (CDI) for Efficient Desalination of Water in Space, Phase I
(<https://techport.nasa.gov/image/136930>)



Final Summary Chart Image

Capacitive Deionization (CDI) for Efficient Desalination of Water in Space, Phase I
(<https://techport.nasa.gov/image/129951>)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
 - └ TX06.1.2 Water Recovery and Management

Target Destinations

Earth, The Moon, Mars